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Wet Corn Gluten Feed Supplementation of Calves Grazing Corn Residue

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Table 5. Chemical analysis of silages used in Experiment 2.

Item (% of DM)	N4242 Bt	N4242 nonBt	N7333 Bt	N7333 nonBt	SEM
DM %	40.2	39.0	37.6	37.8	—
Ash	4.1	4.5	6.1	4.7	.07
CP	7.0	7.2	6.1	6.3	.11
NDF	38.9	36.7	41.1	42.4	.60
ADF	24.7	22.1	26.4	23.8	.20
PL ^a	5.2	4.4	5.6	5.1	.15
ADL ^b	3.3	2.7	3.6	3.4	.04
Starch	37.6	38.6	37.3	37.1	.21
30-h NDF Dig. ^c	32.4	30.8	34.4	31.6	.07
IVDMD ^d	74.3	65.6	69.1	65.6	1.41

^aPermanganate lignin measured according to Goering and Van Soest (1971).

^bAcid detergent lignin measured according to Goering and Van Soest (1971).

^c30-hour neutral detergent digestibility measured in vitro.

^dIn vitro dry matter digestibility measured using modified procedures of Tilley and Terry (1963).

interaction was observed for daily gain and efficiency, steers fed the N4242 gained 11% faster ($P < .01$) and were 7% more efficient ($P < .01$) than those fed corn silage produced from N7333.

The data from these experiments suggest incorporation of the Bt trait has no

effect on corn residue value or preference in grazing beef steers. Producers can take advantage of increased yields and reduced pesticide use with Bt corn hybrids without adverse effects on corn residue grazing performance. Stocking rates may need to be adjusted for Bt

hybrids because of the potential reduction in residual corn, or more supplemental feed may be needed to maintain daily gain compared with nonBt hybrids. The interaction of hybrid genetics and incorporation of the Bt trait observed with corn silage growing diets is difficult to explain, and may be related to slight changes in the chemical composition of the silages (Table 5). Most importantly, hybrid genetics have a larger influence on daily gain and feed efficiency of growing steers fed corn silage-based diets compared with changes associated with incorporation the Bt trait in these hybrids.

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Wet Corn Gluten Feed Supplementation of Calves Grazing Corn Residue

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Feeding wet corn gluten feed to calves grazing cornstalks increases weight gain above non-fed controls. The optimum feeding level is 6.0 lb DM/head/day which can result in 1.8-1.9 lb/day gain.

Summary

Incremental levels of wet corn gluten feed were fed to calves grazing corn residues. Based on statistical and economical analysis of the data collected, feeding wet corn gluten feed (5.0-6.5 lb/head/day; DM basis) will increase stocking rate on corn residue and reduce winter costs by 11%. Given that 3.5 lb

DM/day wet corn gluten feed will meet the protein and phosphorus needs of calves, and feeding above 6.0 lb/d will not increase gains, wet corn gluten feed should be fed at 3.5-6.0 lb DM/day, producing gains from 1.28-1.88 lb/day.

Introduction

Wet corn gluten feed has roughly the same energy value as corn ($NE_g = 0.64-0.68$ Mcal/lb), is moderate in protein (23% CP) and phosphorus (0.95%), is palatable, and is safe to feed in terms of little or no risk of acidosis or founder. With the high concentration of nutrients discussed, WCGF supplies several expensive nutrients in one package. Feeding five lb of WCGF (DM/head/day) is sufficient to meet the metabolizable protein requirement of calves grazing corn residues. However, no animal

performance trials have been conducted to specifically determine the optimum feeding level of WCGF to calves grazing corn residues.

The objective of our study was to evaluate calf growth response to incremental levels of wet corn gluten feed supplemented on corn residues in the late fall and early winter.

Procedure

A steer growth trial was conducted from Oct. 27, 1999 through Jan. 13, 2000 using thirty-seven crossbred steer calves (552 lb) which were individually fed a supplement while grazing corn residues. Steers were assigned randomly to one of seven levels of supplement (2.0, 2.75, 3.5, 4.25, 5.0, 5.75, and 6.5 lb of DM/head/day). The control treatment (7 head) consisted of a sunflower meal-

(Continued on next page)

based supplement fed at 2 lb/head/day (DM basis) that was formulated to meet the degradable intake protein (DIP) requirement of the steers. The second treatment (5 head) was a combination of WCGF (68%) and sunflower meal (32%) fed at 2.75 lb DM/head/day. Sunflower meal was required in the second treatment to meet DIP requirement of the steers. The remaining 5 treatments (5 head/treatment) consisted entirely of WCGF (3.5, 4.25, 5.0, 5.75, and 6.5 lb/head/day; DM basis). All steers were individually fed the appropriate amount of supplement once daily using Calan electronic gates. Each morning at approximately 6:30, steers were gathered for feeding. Steers were allowed a maximum of one hour to consume the respective supplement offered. Following feeding, steers were returned to the cornstalk field. Four 7.4 acre fields were allocated for grazing. Steers were allowed access to a new paddock when visual appraisal indicated that leaf and husk material was limiting.

Initial and final weights were the average of three consecutive-day weights following three days of limit feeding a common diet containing 50% wet corn gluten feed and 50% alfalfa hay fed at 2% of body weight (DM basis).

Results

Steers on the control treatment gained 0.91 lb/day. Average daily gain increased up to 1.86 lb/day as WCGF was included at the 6.5 lb DM/head/day level. When a non-linear statistical analysis was applied to the data, it predicted that gains leveled off at 6.0 lb DM (Figure 1). The analysis suggests feeding WCGF above 6.0 lb DM/day would not increase gains and presumably, the cattle would begin to replace stalk intake with WCGF. Over the past four years, research conducted at the University of Nebraska has used 5.0 lb/head/day (DM basis) of WCGF to increase winter gains (2001 Nebraska Beef Cattle Report, pp. 29-34). Based on the previous research, feeding WCGF in the winter will reduce slaughter breakeven compared to feeding a protein supplement similar to the control

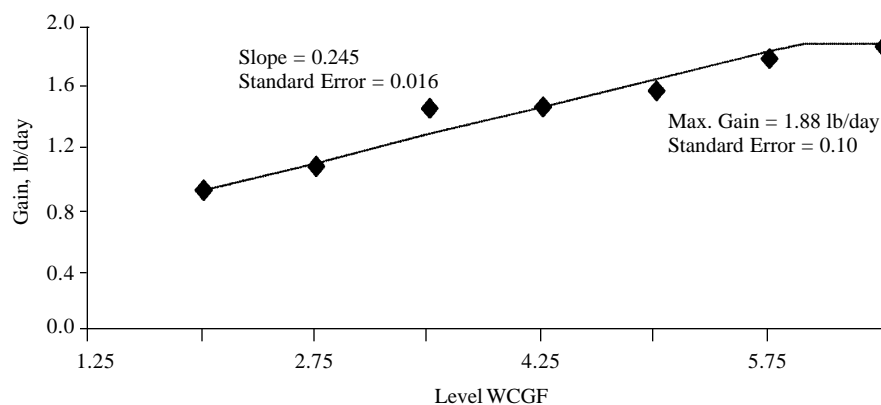


Figure 1. Daily gain of steers supplemented with wet corn gluten feed on cornstalks.

Table 1. Supplement effects on cornstalk intake predicted by two methods.

Supplement Intake ^a	NRC Computer Model ^a	Stalk Intake Equation ^{ab}
2.00	10.4	9.8
2.75	10.2	10.2
3.50	10.1	10.2
4.25	9.3	10.1
5.00	8.5	9.7
5.75	8.6	9.8
6.50	8.6	9.7

^aValues expressed as DM lb/head/day.

^bEquation: $RI = (0.0365W^{0.75} - SD(SI))/1 - RD$, where RI = Residue Intake, SD = Supplement Digestibility, SI = Supplement Intake, and RD = Residue Digestibility.

treatment in the present study. The reduction in slaughter breakeven has been attributed to increased winter weight gain which is maintained throughout summer grazing and finishing, resulting in more sale weight. Therefore, feeding 6.0 lb DM/head/day of WCGF might increase winter weight gain and should further reduce slaughter breakevens compared to feeding 5.0 lb DM/head/day.

Feeding WCGF to calves grazing corn residues should increase the carrying capacity of the cornstalks. Estimates of cornstalk intake were determined from two sources: the 1996 Nutrient Requirements of Beef Cattle computer model and an equation developed specifically to predict corn residue intake from residue digestibility and fecal output (1989 Journal of Animal Science, pp. 581-589). Table 1 shows the intake predictions based on each model. In order to predict stalk intake from the 1996 NRC computer model, net energy adjustments were made based on another article contained within this report (2001 Nebraska

Beef Cattle Report, pp. 116-119). Cornstalk intake was first predicted based on the stalk prediction equation for each level of supplementation. Once a stalk intake was established, it was used to determine the TDN concentration of the total diet and a net energy adjustment was calculated and applied to the 1996 NRC computer model. The 1996 NRC computer model then was used to predict stalk intake to determine how comparable the values were between the two sources. Table 1 shows the stalk intake predicted by the 1996 NRC computer model. While the predicted intakes do not always agree, especially at higher supplement intakes, true values should fall within the range of the two intake predictions at a given level of supplementation. Therefore, higher levels of WCGF (5.0-6.5 lb/head/day DM) reduced cornstalk intake by 10%, from about 10.1 lb/head/day (DM basis) with low level supplementation to 9.1 lb/head/day (DM basis). Economic analysis of winter supplementation of WCGF (2001

Nebraska Beef Cattle Report, pp. 29-34) indicates that extending stalk grazing by 10% would reduce wintering costs and increase profit/head by \$1.00. Without taking the calves completely through a growing/finishing system, it is not possible to determine the optimum level of WCGF supplementation on corn residue. However, these data indicate what gains might be expected with different

levels of WCGF supplementation. About 3.5 lb DM/day is needed to meet the protein and phosphorus requirements of the calves. Therefore, it is logical to feed at least that amount. Based on the non-linear analysis, it seems that 6.0 lb DM/day is a logical upper limit. This range of feeding should result in gains ranging from 1.28-1.88 lb/day. Producers may then select a level of WCGF based on

desired daily gain, stalk availability, cattle frame and weight (as it affects market weight), and length of summer grazing season.

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Impact of Grazing Corn Stalks in the Spring on Crop Yields

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Grazing corn residue in the spring had no detrimental effect on subsequent soybean yields and may slightly increase yields.

Summary

A two-year experiment was designed to determine the impact of grazing corn residue during the spring on subsequent soybean yields in a corn-soybean rotation. Tillage treatments consisting of ridge-till, fall-till, spring-till, and no-till were also evaluated to determine if yields could be maintained by alleviating compaction from grazing in the spring. Grazing treatments overall, and specifically in the ridge-till and no-till systems, resulted in increased yields. Residue cover was also more sensitive to changes in tillage rather than grazing; however, both treatments decreased residue cover.

Introduction

Traditional corn residue grazing occurs from November to February. Based on numerous research trials at the University of Nebraska Agricultural

Research and Development Center, grazing corn residue during this period does not impact subsequent crop yields, whether corn or soybeans (1997 Nebraska Beef Report, pp. 34-37). While grazing corn residues decreases residue and increases bulk density of soil, presumably no impact is observed, because cattle were only maintained in crop fields while the ground was frozen (1997 Nebraska Beef Report, pp. 34-37).

However, producers require both holding areas and feed sources for cattle from February until pastures are available in late April. Fields generally are very wet and not frozen from February to April. Therefore, compaction from cattle may cause detrimental yield losses in subsequent crops. The objective of this study was to determine the impact from grazing corn residue from late February until late April on subsequent soybean yields.

Procedure

In 1997, a 90-acre field was identified. The field was split into quarters with ungrazed check strips replicated across each quarter. Crop production was based on an annual corn-soybean rotation with one-half of the field grown to each crop. The field was irrigated by a linear-move (2425 feet width) irrigation system (Valmont, Valley, Neb.) and the grazing areas replicated within each half grown to corn for grazing experiments. The grazing trials were conducted

from Febr. 25 until April 14 in 1998 (48 days) and from March 1 until April 26 in 1999 (56 days). Animals were fed supplement daily at 1.5 lb per head per day. Calf stocking rate was approximately .8 acres per calf for 60 days. The stocking rate was based on average stocking rates to optimize animal performance. Some producers may use spring grazing areas as holding or calving pens where stocking rates are greater than .8 acres per calf.

Tillage treatments included ridge-tilling during the summer, no-tillage, fall tillage with a chisel followed by conventional tillage (disk) in the spring, or spring conventional tillage alone. All tillage treatments were conducted during the corn rotation with no tillage following the soybean crop. Grazed and ungrazed treatments were superimposed on tillage treatments. The no-till, ridge-till, and spring-till treatments each contained a grazed and ungrazed section. Treatments were applied to an eight-row strip and grazing treatments managed with electric wires. Residue cover was measured by determining residue at points in a transect across the eight-row treatment strip.

At harvest, the middle six rows were harvested out of the 8-row strip to maintain one border row on each side and eliminate effects from grazing pressure and fences. Soybean harvest was conducted with a 3300 John Deere combine with a 10-foot head. Each six-row strip

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